



PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Docket No: Q76520

Ludovic FLEURY, et al.

Appln. No.: 10/620,369

Group Art Unit: 2874

Confirmation No.: 9715

Examiner: Tina M. S. WONG

Filed: July 17, 2003

For: A METHOD OF PRODUCING AND IMPROVING AN OPTICAL TRANSMISSION LINE, AND ASSOCIATED COMPENSATION MODULES

SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an Appeal Brief. A check for the statutory fee of \$500.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,



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WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: June 27, 2006



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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

MAIL STOP APPEAL BRIEF - PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

Table of Contents

I. REAL PARTY IN INTEREST.....	2
II. RELATED APPEALS AND INTERFERENCES	3
III. STATUS OF CLAIMS	4
IV. STATUS OF AMENDMENTS	5
V. SUMMARY OF THE CLAIMED SUBJECT MATTER	6
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL	10
06/28/2006 JADDIYI 00000035 10620369	
VII. ARGUMENT.....	11
08 FC:1402	
CLAIMS APPENDIX	21
EVIDENCE APPENDIX:	27
RELATED PROCEEDINGS APPENDIX.....	28

I. REAL PARTY IN INTEREST

The real party in interest is ALCATEL, the assignee of the present application. The assignment was recorded on July 17, 2003, at Reel 014310, Frame 0977.

II. RELATED APPEALS AND INTERFERENCES

Upon information and belief, there are no other prior or pending appeals, interferences or judicial proceedings known to Appellant's Representative or the Assignee that may be related to, be directly affected by, or have a bearing on the Board's decision in the Appeal.

III. STATUS OF CLAIMS

Claims 3-21, all the claims pending in the application, stand rejected and are the subject of the present appeal. The rejections are as follows:

1. Claims 3-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Keys (US 6,456,773) in view of Akasaka et al. (US 5,673,354).
2. Claims 15-21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Keys (US 6,456,773).

All of the claims pending in the present application are set forth in their entirety in Appendix A, attached to this Brief on Appeal.

IV. STATUS OF AMENDMENTS

Appellant submitted an Amendment under 37 C.F.R. § 1.111 on August 11, 2005, which was entered. A Final Office Action issued on September 29, 2005. Appellant submitted a Response under 37 C.F.R. § 1.116 on March 28, 2006, without amendments. Accordingly, there are no outstanding, non-entered amendments of the claims.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention relates to a module for compensating chromatic dispersion in an optical fiber line operating in one or more spectral bands, a method of improving an optical transmission line to operate in one or more additional spectral bands, and a method of operating a multi-band transmission optical fiber line. The concise description of the claimed subject matter of the present invention is set forth below, with regard to each of the respective independent claims 3, 13, 15, and 20. The following discussion includes reference to various portions of the present application to aid in the understanding of the invention. However, such reference, unless otherwise indicated, is intended to point out the described exemplary embodiment; it is not intended to limit the scope of the claims to only the express embodiment cited below.

Claim 3.

Claim 3 recites a module for compensating chromatic dispersion of a line fiber operating in multiple spectral bands, such as the S, C, L, and U bands. *See, e.g.*, Specification at page 9, line 30 to page 10, line 1. With reference to Figs. 1 and 2, the module includes a casing (9) or the like with more than one submodule (4, 5, 8), at least one (5, 8) of which is separable from the structure (9). The submodules are disposed in series and interconnected by a connection (6) identifiable to the naked eye without optical measurement and accessible from the outside without damaging the module. *See, e.g.*, Specification at page 7, lines 32-37. Each of the submodules includes a compensation optical fiber (2, 3, 7). *See, e.g.*, Specification at page 11, line 27 to page 12, line 1. The compensation fiber (7) in one of the submodules (8) is of a

different kind (*i.e.*, has a different compensation ratio as a function of wavelength). *See, e.g.*, Specification at page 10, lines 18-22. Claim 3 also specifies that at least one of the compensation optical fibers has a compensation ratio from 0.9 to 1.1 for the center wavelength of one of the spectral bands. *See, e.g.*, Specification at page 10, line 19-29.

Claim 13.

Claim 13 recites a *method* of improving an optical transmission line. The claim requires *carrying out one or more exchange steps*, beginning with a pre-existing and previously used compensation module for compensating chromatic dispersion in a particular spectral band using a module having a plurality of submodules (4, 5), removing one of the submodules (5) and replacing it with another submodule (8) whose compensation fiber (7) is of a *different* kind to that of the optical fiber in the module being replaced. *See, e.g.*, Specification at page 3, lines 15-31, page 9, line 1 to page 12, line 1 and Figs. 1 and 2. Claim 13 also specifies that the modified module compensates for compensating chromatic in a plurality of contiguous and non-overlapping spectral bands each covering at least 30 nanometers. *See, e.g.*, Specification at page 9, line 30 to page 10, line 1. Claim 13 further specifies that at least one of the compensation optical fibers from the modified module has a compensation ratio from 0.9 to 1.1 for the center wavelength of one of the spectral bands. *See, e.g.*, Specification at page 10, line 19-29.

Claim 15.

Claim 15 recites a method of operating a multi-band transmission optical fiber line. Beginning with a compensation module for compensating chromatic dispersion in the main optical fiber line; the compensation module has a first submodule (4) with a first dispersion compensation fiber (2), and a second submodule (5) with a second dispersion compensation fiber (7). *See, e.g.*, Specification at page 8, line 12 to page 9, line 29 and Fig. 1. The combined first and second dispersion compensation fibers together compensate for chromatic dispersion in the main optical fiber line operating in a first band more effectively than either fiber alone. *See, e.g.*, Specification at page 3, lines 15-31. The method claim further requires the *positive step* of transmitting information over the main optical fiber line in the first band and *later* replacing the second submodule (5) with a third submodule (8) having a dispersion compensation fiber (7) for compensating chromatic dispersion, together with the first dispersion compensation fiber (2), in a second band. *See, e.g.*, Specification at page 10, line 2 to page 11, line 8. The method claim additionally requires the *positive step* of transmitting information over the main optical fiber line in the second band. The second and third submodules are removable from the module and exchangeable with each other, as well as being optically connected to the module by one or more connections identifiable to the naked eye without optical measurement and accessible from the outside without damaging the module. *See, e.g.*, Specification at page 7, lines 32-37.

Claim 20.

Claim 20 is directed to a module assembly, having at least *three* submodules for compensating chromatic dispersion of a line optical fiber. At least two of the submodules are exchangeable with each other. *See, e.g.*, Specification at page 7, lines 32-37. A set of two of the submodules, when serially coupled, compensates for chromatic dispersion for optical signals transmitted in a first band; while a different set of two of the submodules, when serially coupled, compensates for chromatic dispersion for optical signals transmitted in a second band. *See, e.g.*, Specification at page 10, line 2 to page 11, line 8.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues on appeal are summarized as follows:

1. Whether claims 3-14 are unpatentable under 35 U.S.C. § 103(a) in view of Keys (US 6,456,773) and Akasaka et al. (US 5,673,354).
2. Whether claims 15-21 are unpatentable under 35 U.S.C. § 103(a) in view of Keys (US 6,456,773).

VII. ARGUMENT

1. Legal Standard

Each of the Examiners rejections alleges that the claims are obvious under 35 U.S.C. § 103.

In order to establish a *prima facie* case of obviousness, the Examiner must establish three basic criteria. First, there must be some suggestion or motivation, in either the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the references' teachings. Second, the Examiner must show that there is a reasonable expectation of success in combining or modifying the references. Third, the Examiner must show that the prior art reference or references, or asserted teachings, teach or suggest all of the claim limitations in the rejected claims. *See Manual Of Patent Examining Procedure ("MPEP") § 2142.* The Examiner's grounds of rejection do not meet the above criteria and, "[i]n rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness." *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

The Federal Circuit has made it very clear that the USPTO is held to a *rigorous* standard when trying to show that an invention would have been obvious in view of the combination of two or more references. *See, In re Lee*, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002), *citing, e.g., In re Dembicza*k, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is

rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references.”).

The Federal Circuit goes on to emphasize that the “need for specificity pervades this authority.” *In re Lee* at 1433 (emphasis added) (citing *In re Kotzab*, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) (“particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed”).

Appellant respectfully submits that the current grounds of rejection do not satisfy the Federal Circuit’s rigorous standard for demonstrating that the claimed invention would have been obvious in view of Keys alone or in combination with Akasaka et al.

2. *Claims 3-14 In View Of Keys And Akasaka et al.*

- a. Claims 3: The applied references fail to disclose connections identifiable to the naked eye without optical measurements and different kinds of compensation optical fiber

In first rejecting claim 3 over Keys in view of Akasaka et al., the Examiner conceded that *Keys fails to disclose interconnected connections identifiable to the naked eye without optical measurements*, as recited in claim 3, but asserted:

However, it can be observed the boot connectors (427, 435) and adapters (410, 412) are placed on the exterior of the housing. Since the connections can be seen on the exterior of the structure and one of ordinary skill in the art would recognize the boot connectors and adapters as interconnecting pieces and furthermore, *it would be advantageous for the connection pieces to be identifiable for easy and convenience, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to be able to identify the interconnected connections.*

Office Action dated September 29, 2005 at pages 2 (emphasis added). First, it is not at all apparent from the disclosure in Keys that there are connections placed exterior to the housing. Moreover, the Examiner's alleged motivation to make "the connection pieces to be identifiable" so as "to be able to identify the interconnected connections" is not disclosed in Keys and the Examiner has not pointed to support in any other prior art reference.

The Examiner also concedes that Keys *fails to disclose different kinds of compensation fibers* to be used in the submodules, but argues:

However, Keys discloses any type of compensation fiber can be coupled to the communication system. Furthermore, Keys discloses the appropriate fiber should be used in order to gain the result intended. (Column 4) Keys' disclosure is more particularly drawn to the module itself than the optical fibers. Since Applicant does not specifically state or disclose an advantage to using the different fibers and Applicant further discloses the use of the same compensating fibers, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to have different kinds of compensating fibers in the submodules since Keys teaches the use of the appropriate fiber and Applicant fails to specifically disclose the use of different fibers to solve a stated problem or is for a particular purpose.

Office Action dated September 29, 2005 at pages 3.

Appellant argued and maintains that Keys is completely silent with respect to modules having submodules to provide chromatic dispersion in an optical fiber line operating over multiple bands. To the contrary, Keys addresses the problem of requiring a unique length of dispersion compensating optical fiber ("DCF") to provide proper dispersion for a given length of line fiber. Keys does not, however, address the problem of modular DCF devices that can be easily modified to address chromatic dispersion in a line fiber that initially operates in a particular band, but that is later upgraded to operate in a different band or an additional band.

That is, Keys does not teach or suggest modifying the optical device for different bands. Quite the opposite, in Keys, simply the lengths of the DCF fiber segments are modified by changing spools and no account is made for later upgrades for signal transmissions in different bands.

Therefore, Keys, whether taken alone or together with Akasaka et al., does not teach or render obvious claim 3, since Keys does not address chromatic compensation with modules having compensation optical fibers of different *kinds*. In fact, in Keys, the fibers in each spool are of the *same kind*.

The Examiner responded to the Appellant's foregoing position as follows:

Applicant [argues] Keys is silent with respect to modules having submodules to provide chromatic dispersion in an optical fiber line over multiple bands. However, the Examiner disagrees. Applicant states that Keys addresses the use of optical fiber with different lengths. Keys further states that the amount of chromatic dispersion that is compensated depends on the length of the optical fiber. Keys further discloses a variety of different lengths of optical fibers can be placed in the different spools of the submodules. Therefore, Keys does disclose the submodules to provide chromatic dispersions operating over different bands, depending on the length of the optical fibers.

Applicant also argues Keys does not address the device to be easily modified to operate in different bands. However, Keys discloses a variety of optical fibers to be used. Keys further does not limit the type of fibers. Furthermore, it is desirable for the submodules to be able to be upgraded or exchanged in order to reduce cost. Keys does disclose the different submodules and spools that can be removed and exchanged from the module in order to obtain the desired chromatic dispersion.

Office Action dated September 29, 2005 at pages 4-5. Appellant disagrees.

As Appellant argued and maintains, as a whole, the grounds of rejection make only *generalized* statements regarding alleged teachings by Keys, but fail to point to any specific

disclosure that would reasonably support such allegations. *In re Lee*, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002).

Again, the grounds of rejection do not point to any specific disclosure that teaches or even suggests the requirement of having compensation optical fibers of “*different kinds*” as stated in the claim. In fact, Keys not only fails to disclose this feature, but even *teaches away* from it. *See, e.g., In re Hedges*, 228 USPQ 685, 687 (Fed. Cir. 1986) (describing how prior art references may “teach away” from a claimed invention, and concluding that teaching away provides “strong evidence of unobviousness”). Keys is concerned with the problem of building an original optical network operating in a certain band, in which varying lengths of dispersion compensated fiber are required to offset chromatic dispersion in *varying lengths* of the transmission optical fiber throughout the network. Therefore, Keys teaches the use of the *same kind* of optical fiber with varying lengths—not *different kinds* of optical fibers (*i.e.*, having different compensation ratios) as recited in present claim 3 and discussed in Appellant’s specification (*see, e.g.*, the discussion at page 8 and the discussion beginning at page 14 in connection with Fig. 3). Moreover, this distinction is not trivial, as reflected by the fact that Keys is concerned with only the problem of varying lengths of DCF in an original optical network, while Appellant’s invention addresses the problem of upgrading an optical transmission line with multiple bands.

b. Claim 6: The Examiner failed to address the additional limitation of a connection weld recited in this claim

Regarding claim 6, the grounds of rejection fail to even address the limitation that each connection comprises at least one weld. Therefore, claim 6 is allowable for this reason, as well as by reason of its dependency.

c. Claim 13: The Examiner failed to account for the recited *method steps*

Regarding claim 13, the grounds of rejection fail to account for the recited *method steps*, which are neither inherently present nor suggested by the optical network of Keys. Therefore, claim 13 is separately patentable. For example, as noted above, Keys is concerned with the layout of an original network and is entirely silent about the step of *upgrading* a network to operate in *different or additional spectral bands*. Accordingly, Keys fails to disclose the step of replacing one submodule with another “whose compensation optical fiber is of a *different kind*” to that of the other submodule.

The Examiner states at page 5 of the September 29 Office Action that “it is desirable for submodules to be able to be upgraded or exchanged in order to reduce cost.” First, this statement is mere conjecture as it finds absolutely no support in the cited art and falls far short from the Federal Circuit’s requirement in *In re Lee*. Second, a general desirability to upgrade a network would not, by itself, suggest Appellant’s invention (*e.g.*, how to carry out the upgrade). Indeed, with respect to Keys, in particular, this patent would *teach away* from Appellant’s invention given its explicit disclosure of using the same kind of compensation fibers. Therefore, the current grounds of rejection appear to rely on *Appellant’s disclosure* to make the obviousness allegation, rather than relying on the prior art alone. Such hindsight is clearly impermissible. *See, e.g., In re Fritch*, 23 USPQ2d 1780 (Fed. Cir. 1992); *In re Bond*, 15 USPQ2d 1566 (Fed. Cir. 1990); *In re Laskowski*, 10 USPQ2d 1397 (Fed. Cir. 1989); *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988).

Also, regarding the Examiner’s statement that “Keys discloses a variety of optical fibers” (*see* September 29 Office Action at pages 4-5), as explained above, Keys merely discloses

varying the *lengths* of the same kind of fiber and not the use of different *kinds* of fibers within a module.

d. Claim 10: The applied references fail to disclose different kinds of fiber that have the same length

Regarding the requirement in claim 3 for “compensation optical fibers of different kinds,” the Examiner stated in the Advisory Action dated April 6, 2006:

although Keys does not disclose different kinds of fibers as Applicant’s specification would suggest, Keys discloses different lengths of the same optical fiber and therefore creating different amounts of chromatic dispersion depending on the length. Therefore, each length has a different chromatic dispersion and is therefore a different kind of fiber since each length has different characteristics. This conclusion reflects the claim language. The claim language does not suggest how the optical fibers differ.

The Examiner is thus equating the claimed language “different kinds” to cover two identical fibers having different lengths. Appellant submits that this is an incorrect interpretation of the claim language, especially when the claim is properly read in light of the specification. Furthermore, even if, for the sake of argument alone, one were to accept the Examiner’s position, the Examiner has overlooked claim 10, for example, which requires that the “compensation optical fibers of all the submodules are the same length.” Indeed, for the Examiner to reject claim 10, the Examiner is required to present inconsistent and conflicting positions.

e. Claim 21: The Examiner has failed to address the requirement for negative chromatic dispersion

Regarding claim 21, which depends from claim 3, the Examiner failed to even address the limitation recited that each compensation fiber has a *negative* chromatic dispersion, coupled with the limitations of claim 3 from which claim 21 depends.

2. *Claims 15-20 In View Of Keys*

a. Claim 15: The Examiner failed to account for the recited *method* steps

In rejecting claims 15-20 over Keys (US 6,456,773), the Examiner stated:

Keys discloses a main fiber line (425), a compensation module with at least two submodules connected in series, each with a dispersion compensation fiber, transmitting information over the main fiber line, and the ability to replace the second module with a third module, where the second and third submodules are removable from the module and exchangeable with each other. But Keys fails to specifically disclose the dispersion compensation fibers to be compensating for chromatic dispersion.

However, Keys does disclose that depending on the length of the dispersion compensated fiber; the amount of chromatic dispersion is affected. Since Applicant discloses a first length, a second length and a third length and Keys discloses many different lengths or spans can be used, the dispersion compensated fibers do compensate chromatic dispersion.

Keys further fails to specifically disclose one or more connections identifiable to the naked eye without optical measurements. However, it can be observed the boot connectors and adapters are placed on the exterior of the housing. Since the connections can be seen on the exterior of the structure and one of ordinary skill in the art would recognize the boot connectors and adapters as interconnecting pieces and furthermore, it would be advantageous for the connection pieces to be identifiable for ease and convenience, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to be able to identify the interconnected connections.

Office Action dated September 29 at pages 3-4. Appellant respectfully disagrees and maintains that the Examiner has not set forth a *prima facie* basis for rejecting method claims 15-20.

First, claim 15 recites a *method* of operating a multi-band transmission optical fiber line, requiring the steps of replacing a submodule for compensation in a second band, different from

the first band that was transmitted over the optical fiber line. For reasons discussed above in connection with claim 13, Keys clearly fails to teach or suggest these steps.

Furthermore, in response to the Examiner's positions that the compensation module disclosed in Keys has the "*ability* to replace the second module with a third module . . . ,” even if this were true, there is no disclosure of actually carrying out the replacement step recited in claim 15. That is, that an apparatus has the “*ability*” of being modified does not, alone, teach or suggest the step of carrying out the modification. Moreover, one skilled in the art would be dissuaded from making such modifications having read the disclosure of Keys, since this patent teaches the use of the *same kind* of compensation fibers in building an original network and not upgrading a network to add spectral bands.

b. Claim 17: The applied references fail to disclose different kinds of fiber that have the same length

Claim 17 depends from claim 15 and further requires that “first length equals the second length.” Even if, for the sake of argument alone, one were to accept the Examiner’s position, the Examiner has overlooked this additional feature recited in claim 17. Accordingly, in order for the Examiner to reject claim 17, the Examiner can no longer rely on the position (which Appellant maintains is incorrect) that Keys teaches compensation fibers of different kinds by virtue of the fact that Keys discloses fibers of different lengths.

c. Claim 20: The applied references fail to disclose a module assembly having interchangeable submodules as claimed

Claim 20 is patentable, as Keys fails to teach or suggest a module assembly having three submodules with at least two being interchangeable and that include a set of two of the submodules that, when serially coupled, compensate for chromatic dispersion for optical signals

transmitted in a first band; while a different set of two of the submodules, when serially coupled, compensates for chromatic dispersion for optical signals transmitted in a second band. That is, Keys fails to teach or suggest a modular system for chromatic compensation designed to allow an optical network to operate in one band and later in another band.

Conclusion

For at least the reasons set forth above, Appellant submits that the outstanding rejections are in error and reversal is respectfully requested.

Unless a check is submitted herewith for the fee required under 37 C.F.R. §41.37(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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WASHINGTON OFFICE
23373
CUSTOMER NUMBER

Date: June 27, 2006

CLAIMS APPENDIX

CLAIMS 3-21 ON APPEAL:

3. A module for compensating chromatic dispersion of a line optical fiber (1) in a plurality of contiguous and non-overlapping spectral bands each covering at least 30 nanometers, characterized in that the module includes a structure (9) carrying a plurality of submodules (4, 8) at least one of which is separable from the structure (9), which are disposed in series, which are interconnected by one or more connections (6) identifiable to the naked eye without optical measurement and accessible from the outside without damaging the module, and each of which includes a support to which is fixed at least one optical fiber (2, 7) for compensating chromatic dispersion, at least one optical fiber (2) of said plurality of compensation optical fibers (2, 7) having a compensation ratio from 0.9 to 1.1 for the center wavelength of one of said spectral bands, at least two submodules (4, 8) having compensation optical fibers (2, 7) of different kinds.

4. A compensation module according to claim 3, characterized in that the spectral bands are bands C and L.

5. A compensation module according to claim 3, characterized in that each compensation optical fiber has a compensation ratio from 0.9 to 1.1 for the center wavelength of one of the spectral bands.

6. A compensation module according to claim 3, characterized in that each connection comprises at least one weld.

7. A compensation module according to claim 3, characterized in that each connection comprises at least one connector.

8. A compensation module according to claim 3, characterized in that the submodules are independent of one another.

9. A compensation module according to claim 3, characterized in that the module comprises only two submodules.

10. A compensation module according to claim 3, characterized in that the compensation optical fibers of all the submodules are the same length.

11. A compensation module according to claim 3, characterized in that each submodule comprises only one compensation optical fiber.

12. A method of producing an optical transmission line, the method including a step of installing a line optical fiber (1) and a compensation module according to claim 3 for said line optical fiber.

13. A method of improving an optical transmission line comprising a line optical fiber (1) and a pre-existing and previously used compensation module for compensating chromatic dispersion of the line optical fiber in a given spectral band, including a module that comprises plurality of submodules, at least one of which is separable from the module, wherein the plurality of submodules are disposed in series and interconnected by one or more connections identifiable to the naked eye without optical measurement and accessible from the outside without damaging the module, and wherein each of the submodules includes a support to which is fixed at least one optical fiber for compensating chromatic dispersion in the given spectral band, the compensation optical fiber is the same kind for the plurality of submodules, the method comprising one or more exchange steps each consisting of removing from said module one of the plurality of submodules and replacing it with another submodule (8) whose compensation optical fiber (7) is of a different kind to the optical fiber (2) of the submodule (5) that has been removed, in order to obtain a module for compensating chromatic dispersion of a line optical fiber (1) in a plurality of contiguous and non-overlapping spectral bands each covering at least 30 nanometers; and wherein at least one optical fiber (2) in one of the remaining submodules has a compensation ratio from 0.9 to 1.1 for the center wavelength of one of the spectral bands.

14. A method according to claim 13 of improving an optical transmission line, characterized in that at least one of the original submodules (4) has not been subjected to and is not subjected to any of said exchange steps.

15. A method of operating a multi-band transmission optical fiber line, comprising:
 - providing a main optical fiber line;
 - providing a compensation module for compensating chromatic dispersion in the main optical fiber line; wherein the compensation module comprises a first submodule comprising a first dispersion compensation fiber having a first length, and a second submodule comprising a second dispersion compensation fiber having a second length; and wherein the first dispersion compensation fiber and the second dispersion compensation fiber are selected to compensate for chromatic dispersion in the main optical fiber line when operating in a first band so that the combined first length and second length compensates for chromatic dispersion in the first band more effectively than the first length alone and the second length alone;
 - initially transmitting information over the main optical fiber line in the first band;
 - later replacing the second submodule with a third submodule comprising a third dispersion compensation fiber having a third length, and wherein the third dispersion compensation fiber is selected to compensate for chromatic dispersion in the main optical fiber line when operating in a second band so that the combined first length and third length compensates for chromatic dispersion in the second band more effectively than the first length alone and the third length alone;
 - after replacing the second submodule with a third submodule, transmitting information over the main optical fiber line in the second band; and

wherein the second and third submodules are removable from the module and exchangeable with each other; and

wherein, when inserted in the module, the second and third submodules, respectively, are optically connected to the module by one or more connections identifiable to the naked eye without optical measurement and accessible from the outside without damaging the module.

16. The method of claim 15, wherein the first submodule and the second submodule are associated in series when optically connected to the module, and wherein the first submodule and the third submodule are associated in series when optically connected to the module.

17. The method of claim 15, wherein the first length equals the second length.

18. The method of claim 15, wherein the first band is C band.

19. The method of claim 18, wherein the second band is L band.

20. A module assembly for compensating chromatic dispersion of a line optical fiber operating in different bands, comprising at least three submodules; wherein a first set of two of the plurality of modules, when serially coupled within the module, compensates for chromatic dispersion for optical signals transmitted in a first band, and

a second set of two of the plurality of modules, when serially coupled within the module, compensates for chromatic dispersion for optical signals transmitted in a second band; and wherein at least two of the submodules are modular so as to be readily exchangeable within the module.

21. The compensation module according to claim 3, wherein each compensation optical fiber has a negative chromatic dispersion.

EVIDENCE APPENDIX:

Pursuant to 37 C.F.R. § 41.37(c)(1)(ix), submitted herewith are copies of any evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or any other evidence entered by the Examiner and relied upon by Appellant in the appeal.

NONE.

RELATED PROCEEDINGS APPENDIX

Submitted herewith are copies of decisions rendered by a court or the Board in any proceeding identified about in Section II pursuant to 37 C.F.R. § 41.37(c)(1)(ii).

NONE.